

California Energy Commission Bioenergy Action Plan Workshop

March 9, 2006

Robert Bosch Corp. Comments



Summation Roadmap Concept For North American Light Duty Dieselization

Meet Tier II
Bin 5
Challenge

- Ultra Low sulfur + high “quality” fuels
- Advanced engine combustion strategies
- High pressure/flexible fuel system technology
- Stabilize & introduce diesel aftertreatment systems

Refinement
Fuels/Combustion/EGT

- Advancements of fuels
 - Bio blends – minimal (B2 to B5)
 - Combustion and aftertreatment alignment

Alternate Fuels

- Bio blends – moderate (B10 or B20)
 - Bio mass
 - GtL

2006

2008

2010

2012

2014

Powertrain Division



BOSCH

Biodiesel Concerns

Aging products
(**from insufficient stability**)

Polymers → filter clogging
deposits inside FIE
seizure
nozzle coking

Acids → corrosion
soap formation

Peroxides → damaged seals

Note: Seals in new Bosch FIE are generally compatible with good quality Biodiesel



6an06 US-Biodiesel validation

ASTM D6751 / EN14214 – Relevant Parameters

Property		ASTM D 6751	ASTM D 6751 May 2005 voting	ASTM D 6751 further changes required	EN 14214
	Unit	Limits	Limits	Limits	Limits
Density at 15 °C	kg/m ³	missing		not required for B100 blending	860 – 900
Viscosity at 40 °C	mm ² /s	1.9 – 6.0	1.9 – 5.0	5.0 max limit re-ballot for June06	3.5 – 5.0
Water content	mg/kg	max. ~500		separate test methods for evaluation of the water content and level of total contamination required	max. 500
Total contamination	mg/kg				max. 24
Copper strip corrosion (3 h at 50 °C)	rating	class 3		class 1	class 1
Oxidation stability, 110 °C, Rancimat test	hours	missing	changes declined	≥ 6.0 h for B20	6.0
Acid value	mg KOH/g	max. 0.80	max. 0.50	0.5 max passed Dec05 ASTM D02, now part of D6751	max. 0.50
Group I (alkali) metals (Na+K) Group II metals (Ca+Mg)	mg/kg mg/kg	missing missing	max. 5.0 changes declined	max. 5.0 Na+K passed Dec05 ASTM D02, now part of D6751 max. 5.0 Ca+Mg passed E0, to be balloted in D02	max. 5.0 max. 5.0



Recommendations

Break down the discussion of biodiesel specs into stages:

- Consider how widespread the biodiesel market is and where it should be by a certain date. As noted in the 2005 IEPR, there is only enough bio feedstock and production capacity in the U.S. for a B2 to B5 blend nationwide. Beyond that there may be certain limited fleet objectives that require higher concentrations or blends of biodiesel, perhaps up to B20 as specified by EPA Act.
- Ask CARB to work with other appropriate state agencies, biofuel producers and automotive industry participants to develop a “California spec” for biodiesel quality in concentrations up to B2, B5 and B20.
- Begin this process with a mainstream, soy-based feedstock as a way to fast-track a biodiesel quality spec benchmark for all other feedstocks to follow.
- Require all feedstocks to meet the same quality standards as the benchmark.



Recommendations (cont.)

- CARB is drafting an agreement with UC Riverside researchers to test the emissions characteristics of a potential “California biodiesel” that would be produced from state blendstocks. Add to those tests:
 - Recommend CARB and other relevant state agencies first establish a benchmark “California biodiesel” quality spec.
 - Recommend that CARB assess the impact of all biodiesel blends on engine aftertreatment systems. There seems to be very little data on this, in particular the effects on reliability of aftertreatment (particulate filter and/or NOx catalysts) performance after long-term use of biofuels.
 - Have soy-based biodiesel emissions testing as the first of many feedstocks in order to establish a baseline understanding of emissions against which all other feedstocks would be measured.
- Include more automotive industry representatives in the CEC’s list of “stakeholders” to insure a complete circle of expert involvement: academic, government, fuel producer, fuel user

